Steering and Maneuvering in Jellyfish Bells

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Using an immersed boundary simulation of an elastic jellyfish bell, we model jellyfish propulsion by applying an active tension to the lower half of bell that pushes fluid out of the bell, transferring momentum from the bell to the surrounding fluid environment. There are no prescribed kinematics in this simulation, only prescribed tension. The images display the results from our model during forward propulsion and turning at Re=500.

From top to bottom, velocity vectors are plotted for during a turning movement. An asymmetric contraction wave is initiated at the inner pivot of the turn and travels along the rim of the bell. The elastic recoil of the bell pushes water into the cavity bell, generating angular momentum.

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